



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,380	11/30/2004	Toshiki Makimoto	14321.63	2860
22913 7590 12/27/2006 WORKMAN NYDEGGER (F/K/A WORKMAN NYDEGGER & SEELEY) 60 EAST SOUTH TEMPLE 1000 EAGLE GATE TOWER SALT LAKE CITY, UT 84111			EXAMINER NGUYEN, TRAM HOANG	
			ART UNIT 2818	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE 3 MONTHS		MAIL DATE 12/27/2006	DELIVERY MODE PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/516,380

Applicant(s)

MAKIMOTO ET AL.

Examiner

Tram H. Nguyen

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 50-60 and 77-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 50-60 and 77-79 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/30/2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 06/27/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group II, claims 50-60 in the reply filed on 11/29/2006 is acknowledged. Furthermore, Claims 77-79 have been added. Therefore, claims 50-60 and 77-79 are pending in this application.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include no figures that mentioned in the present Specification (Note: Examiner has found the figures in certified copy of Foreign Priority Application). Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

Art Unit: 2818

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 50-60 and 77-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Makimoto et al. (US 2002/0195619).

Regarding **claim 50**, Makimoto et al. disclose a nitride semiconductor structure (fig. 10) comprising: on a substrate (item 101); an n-type collector layer (item 104); a p-type base layer (item 106) formed on said n-type collector layer (104); and an n-type emitter layer (107) formed on said p-type base layer (106), wherein a surface of said p-type base layer (106), which is exposed by etching said n-type emitter layer (see fig. 10).

Makimoto fails to teach an indium-containing p-type nitride semiconductor layer regrown on the exposed base surface. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include an indium-containing p-type nitride semiconductor layer regrown on the exposed base surface in the nitride semiconductor bipolar transistor structure as taught by Makimoto et al. so that the electrodes ejected can pass through the indium containing p-type nitride semiconductor layer and reach the collector. Therefore, the device has a further advantage of being able to increase the collector current; thereby achieving high current gain (par.[0029], lines 8-11).

Regarding **claim 51**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer is p-type InGaN. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer comprising p-type InGaN in the nitride stacked semiconductor as taught by Makimoto in order to reduce the cost of manufacturing

device instead of using some other Indium containing p-type nitride semiconductor layer.

Regarding **claim 52**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Fig. 10 shows said p-type base layer is p-type InGaN (106).

Regarding **claim 53**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see fig. 10).

Regarding **claim 54**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 55**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type base layer is p-type InGaN (see claim 52's rejection).

Regarding **claim 56**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see claim 53's rejection).

Regarding **claim 57**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 58**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above. Besides, Makimoto et al. teach said p-type InGaN base layer has an indium mole fraction of 5-30% (see claim 53's rejection).

Regarding **claim 59**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of

said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 60**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set-forth above except for said p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer. However, it would have been obvious to one having ordinary skills in the art at the time the invention was made to include the p-type nitride semiconductor layer has an indium mole fraction higher than an indium mole fraction of said p-type InGaN base layer in the nitride semiconductor as taught by Makimoto since there is no other indium containing the p-type nitride semiconductor layer eliminate the the space charges generated by piezoelectrode or spontaneous polarizattion; thereby increasing the Indium composition to achieve the large current gain in nitride semiconductor (par.[0082], lines 1-3).

Regarding **claim 77**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item

104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Regarding **claim 78**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item 104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Regarding **claim 79**, Makimoto et al. disclose all the limitations of the claimed invention for the same reasons as set forth above. Furthermore, Fig. 10 shows a graded layer between the p-type base layer (106) and the n-type collection layer (item 104); wherein the graded layer has its indium mole fraction varied gradually (see par.[0009],lines 1-3).

Conclusion

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tram Hoang Nguyen whose telephone number is (571)272-5526. The examiner can normally be reached on Monday-Friday, 8:30 AM – 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the

Art Unit: 2818

examiner's supervisor, Mathew Smith can be reached on (571)272-1907. The fax numbers for all communication(s) is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571)272-1625.

THN
Art Unit 2818
12/16/2006

Andy Hays
Andy Hays
Primary Examiner